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Erker

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(54) **SEAT HAVING A SEAT PANEL AND A BACKREST**

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(73) Assignee: **Sato Office GmbH** (DE)

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A47C 3/00 (2006.01)

(52) **U.S. Cl.** **297/300.2**; 297/322; 297/316

(58) **Field of Classification Search** 297/300.2, 297/300.4, 300.5, 316, 321, 322
See application file for complete search history.

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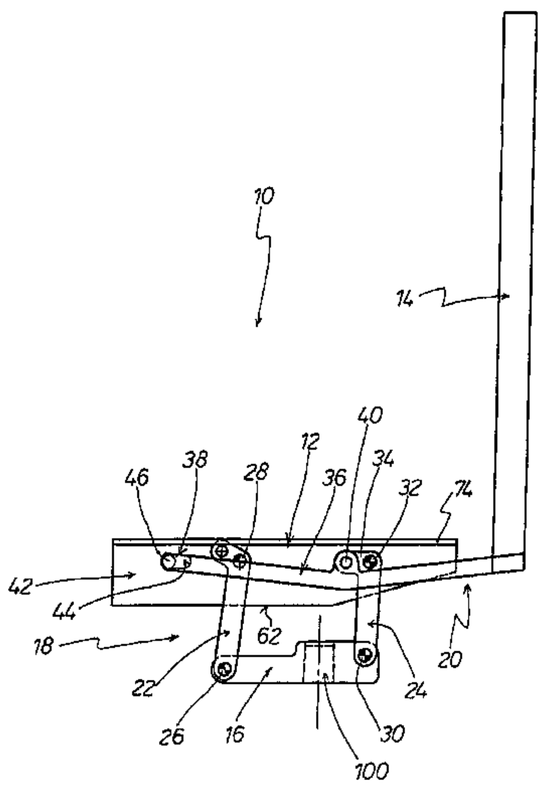
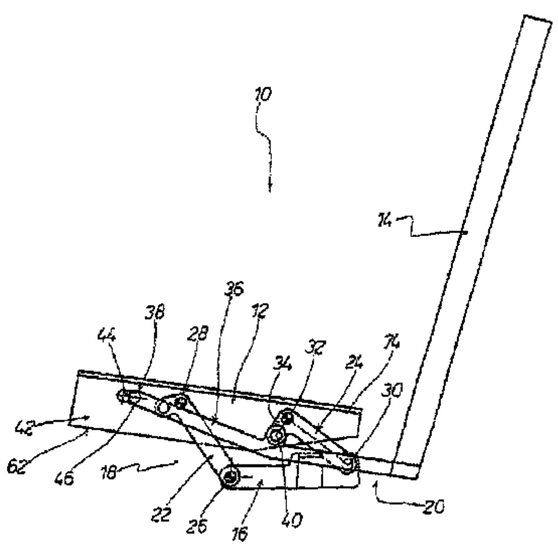
(57) **ABSTRACT**

A seat (**10**) having a seat panel (**12**) and a backrest (**14**) is described. The seat panel (**12**) is connected to a base device (**16**) by means of a first connecting device (**18**). The backrest (**14**) is connected to the seat panel (**12**) by means of a second correcting device (**20**). The first connecting device (**18**) comprises a pair of front and a pair of rear connecting levers (**22**, **24**). The front connecting levers (**22**) are longer than the rear connecting levers (**24**). The rear connecting levers (**24**) are designed with an angled extension (**34**) so as to form toggle levers. The second connecting device (**20**) comprises a pair of rod elements (**36**) which are mounted in a pivotable and linearly movable manner on the seat panel (**12**) by way of their front end (**38**) and which are connected in a pivotable manner to the angled extension (**34**) of the rear connecting levers (**24**).

12 Claims, 9 Drawing Sheets





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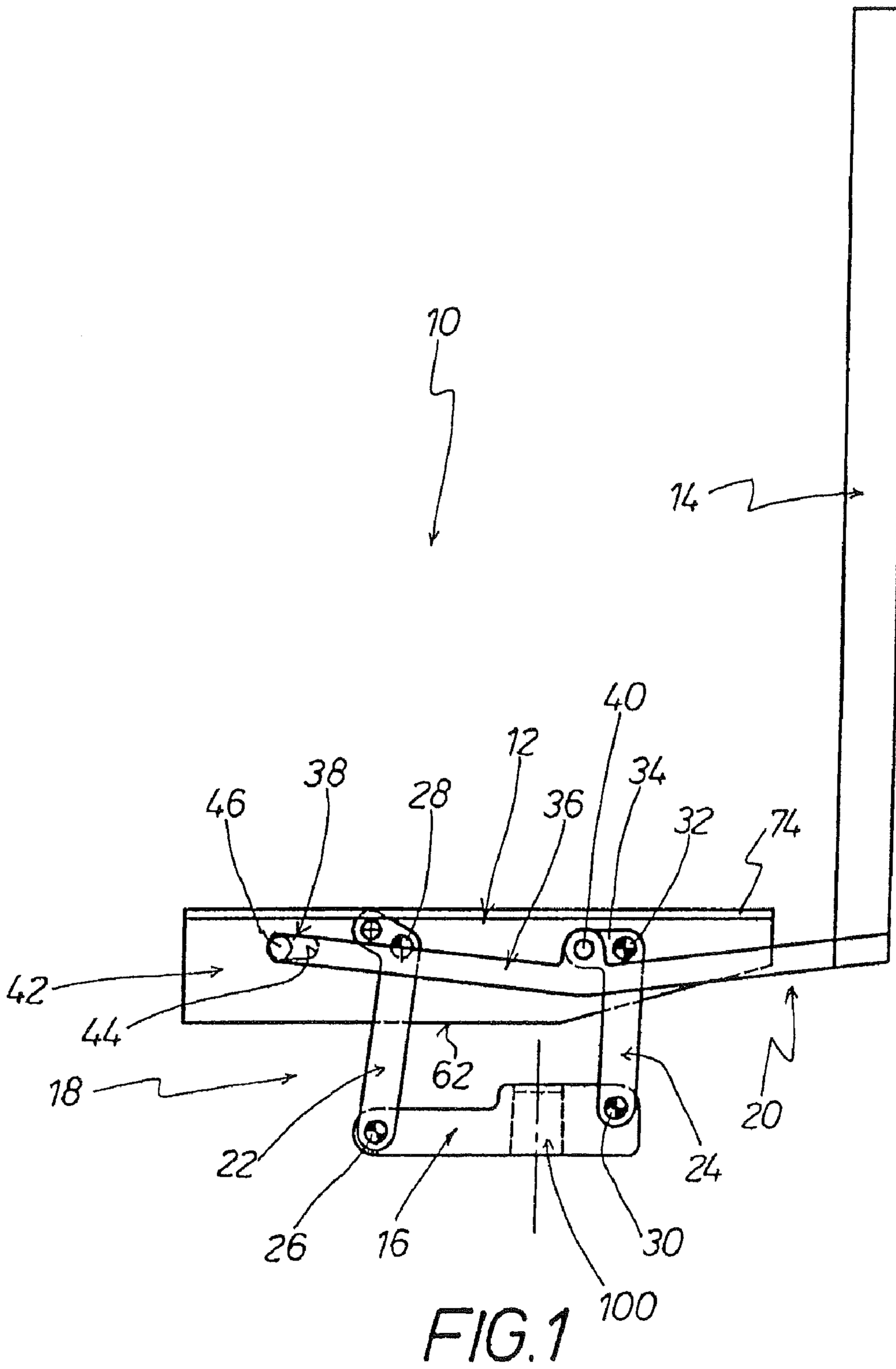

FIG.1

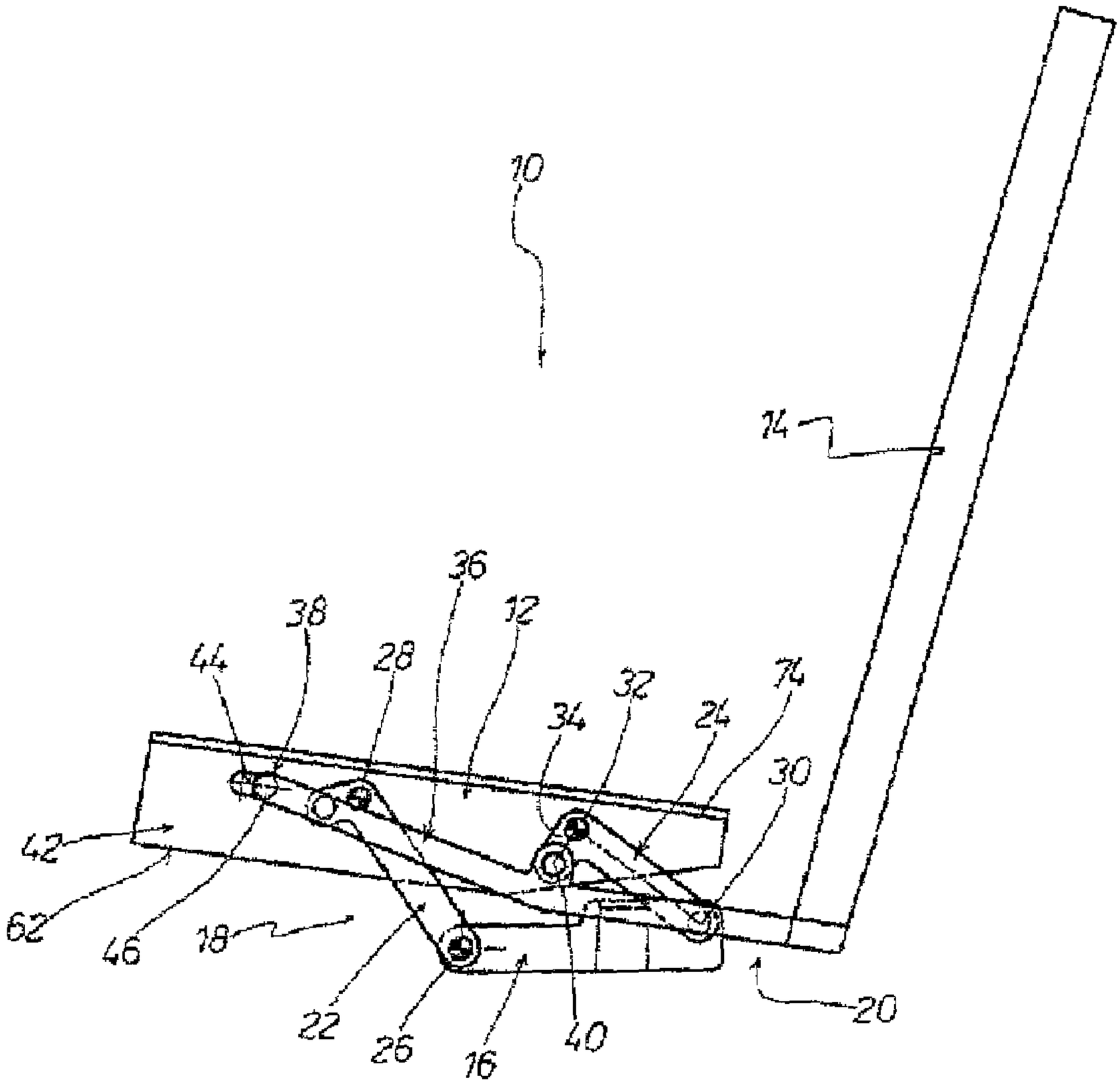

FIG. 2

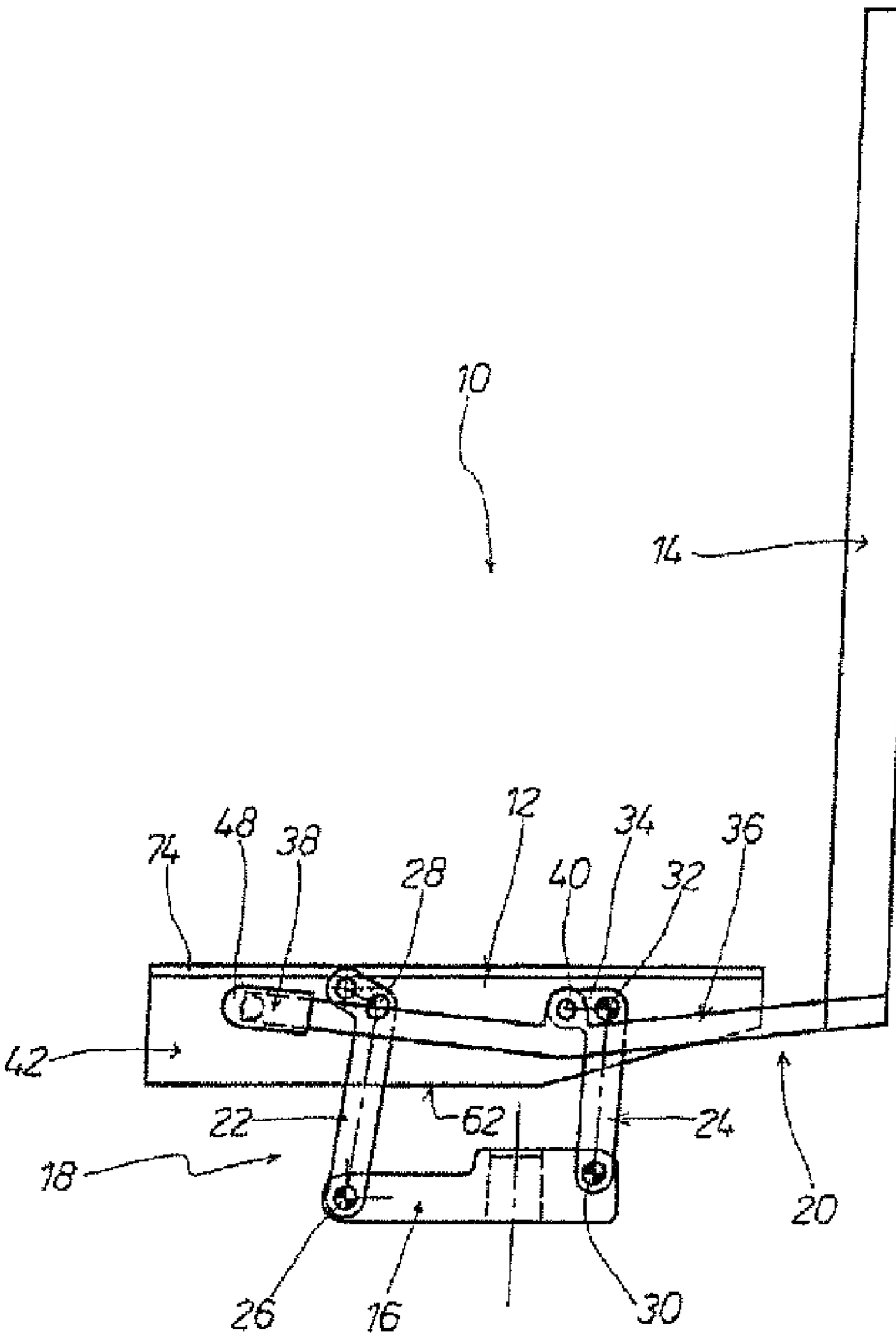

FIG. 3

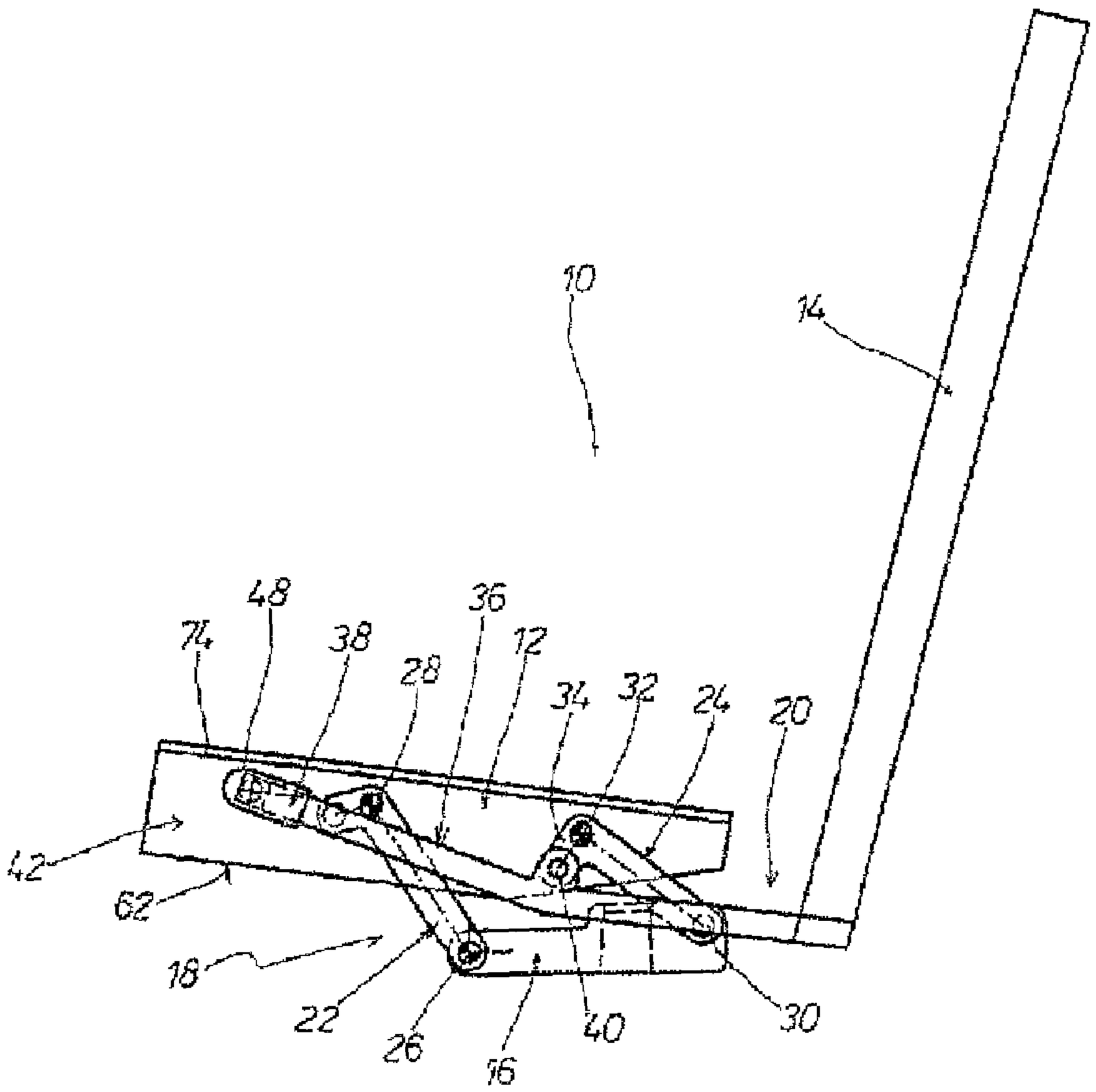

FIG. 4

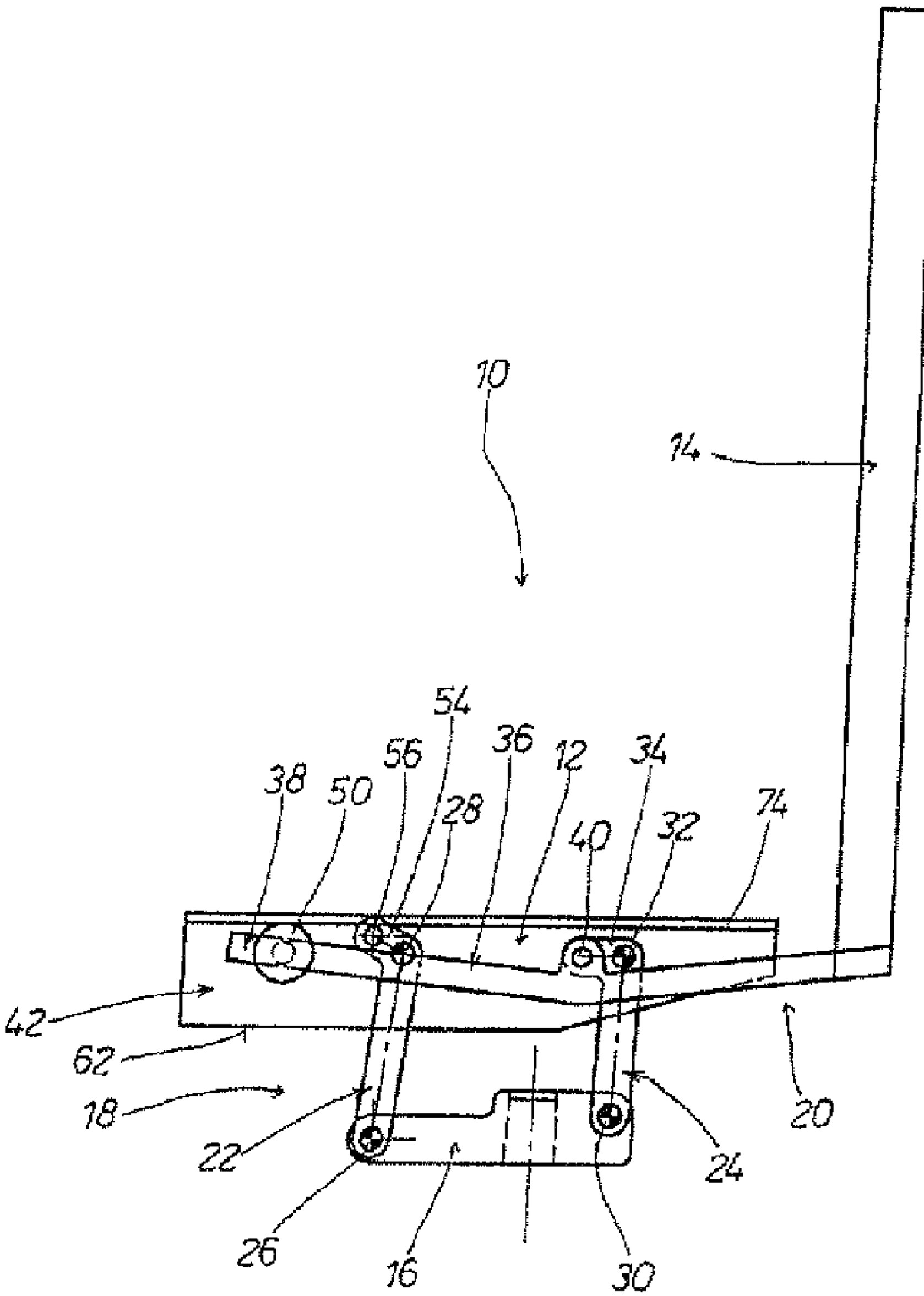

FIG. 5

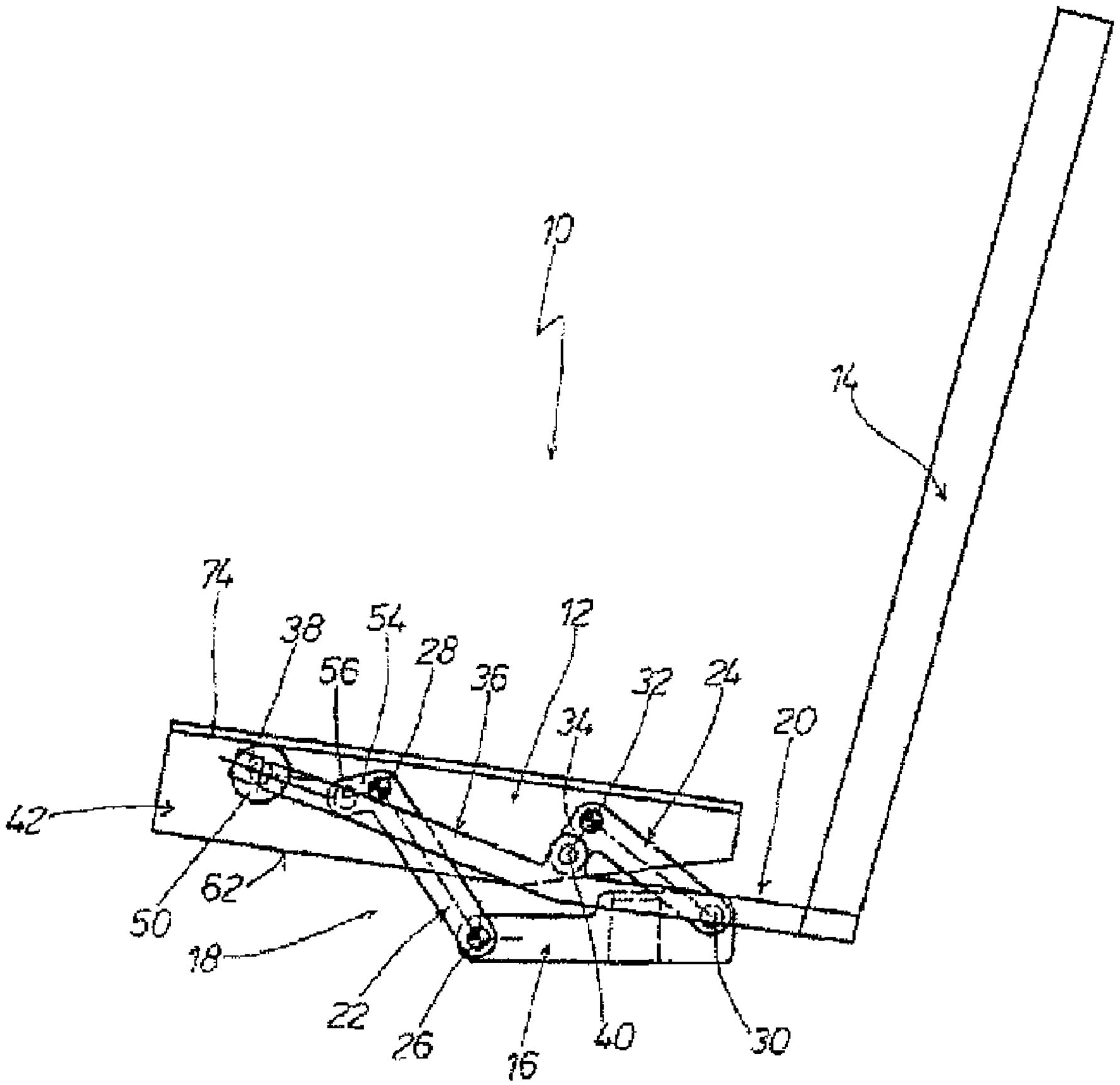

FIG. 6

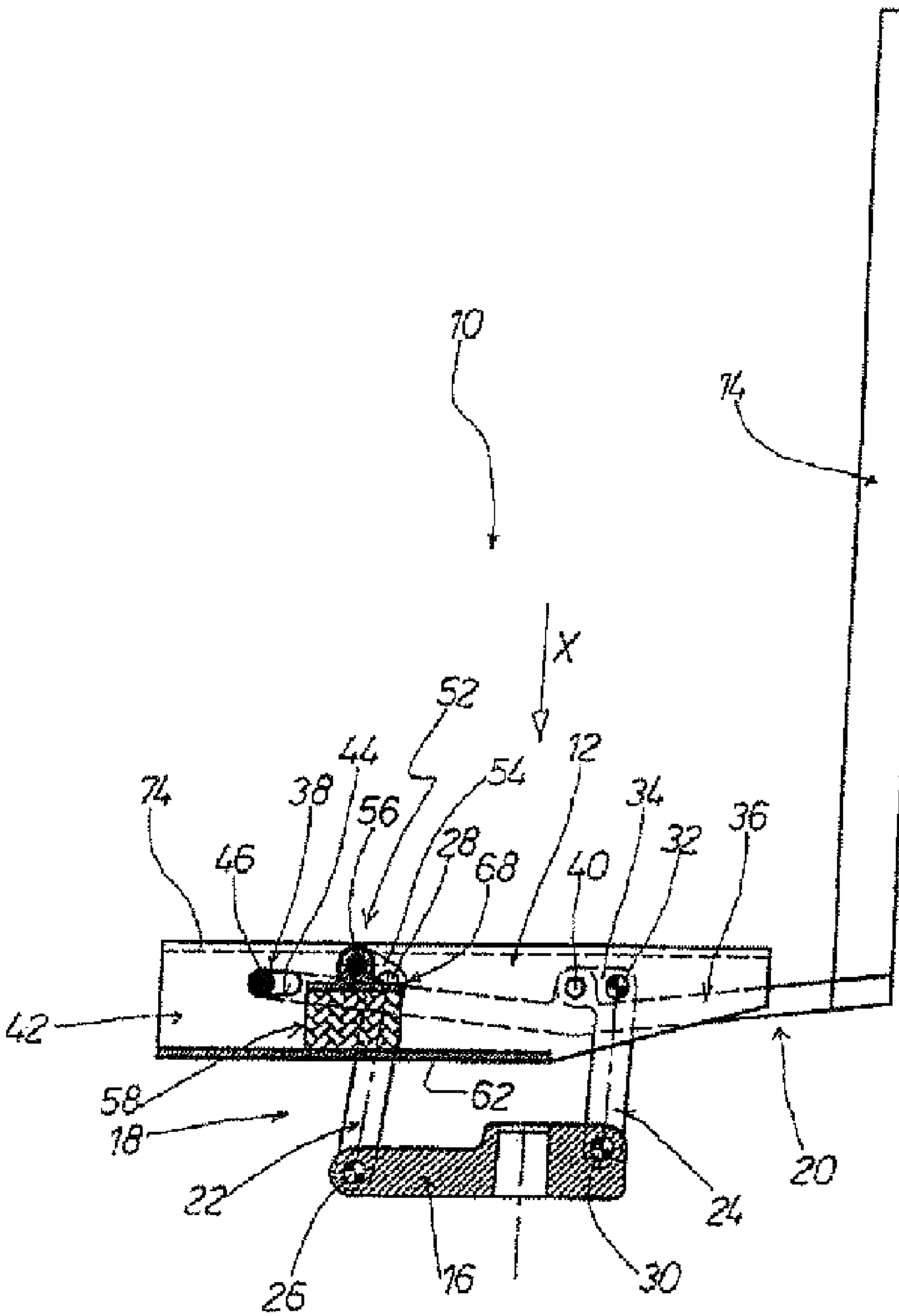
10
74
X
52
44
54
12
74
38
56
28
34
36
46
68
40
32
42
58
62
18
20
22
24
26
16
30

FIG. 7

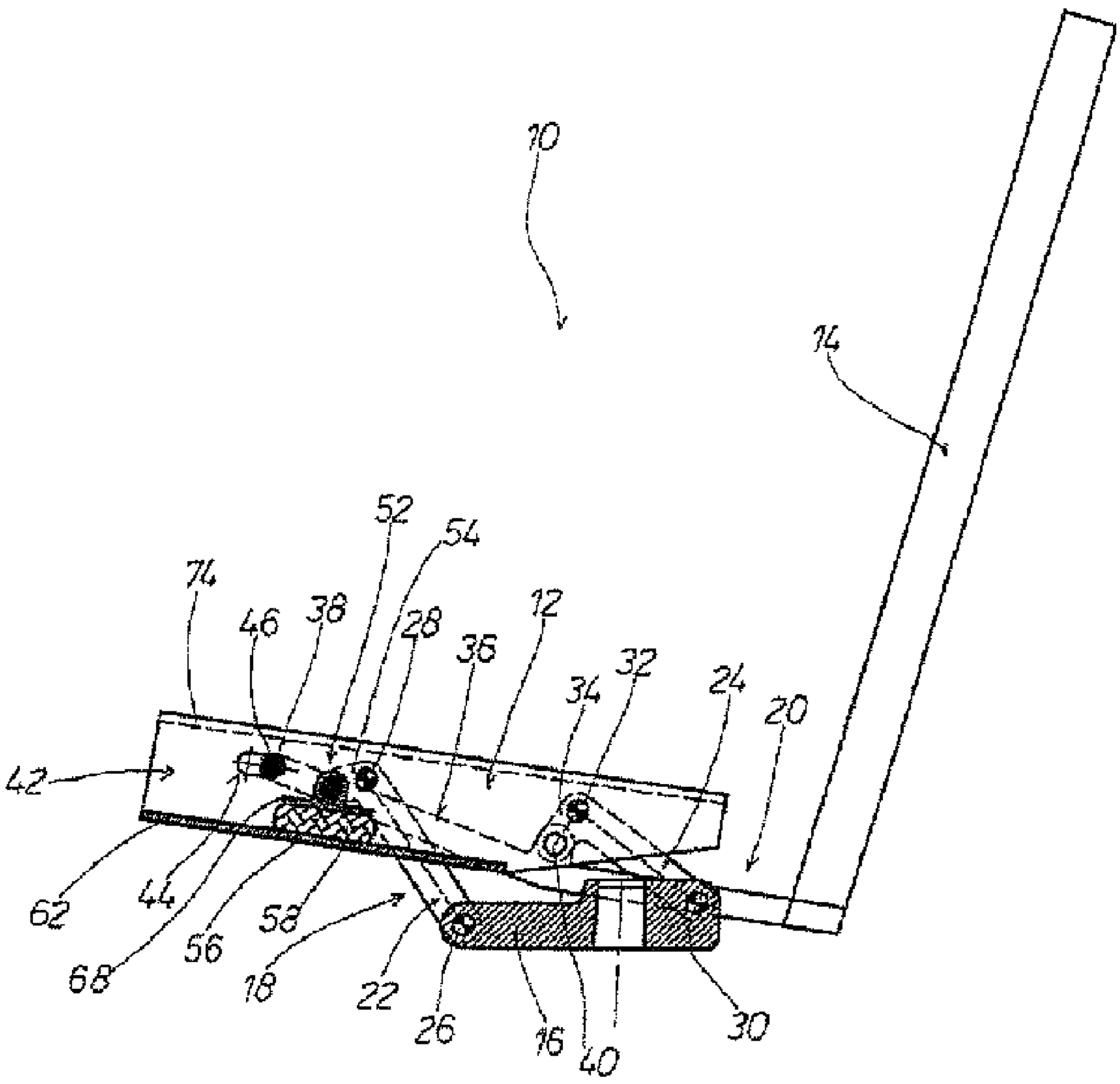
10
14
52
54
74
46
38
28
12
36
34
32
24
20
42
62
44
56
58
68
18
22
26
16
40
30

FIG. 8

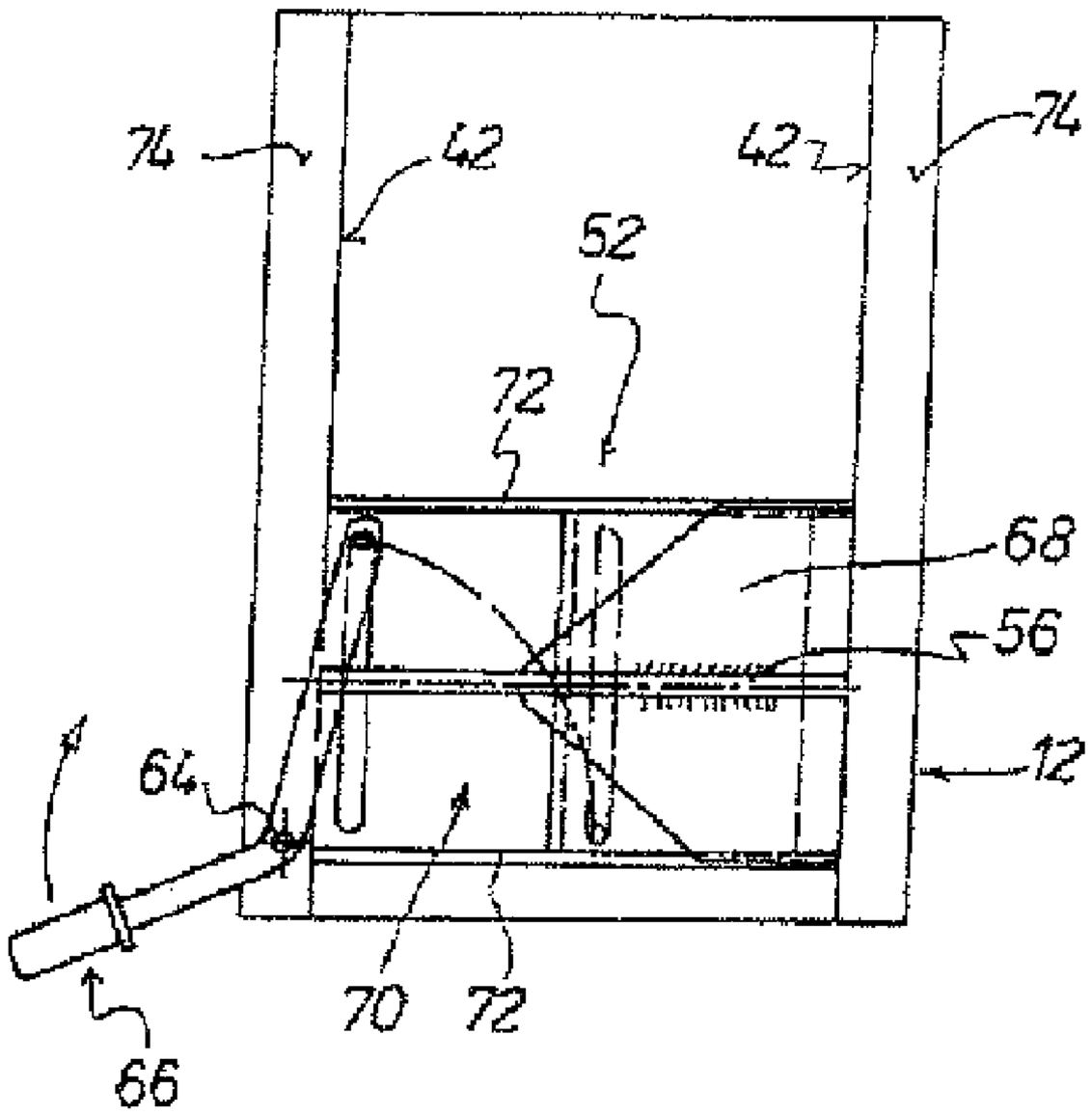
74
42
42
74
52
72
68
56
12
64
70
72
66

FIG. 10

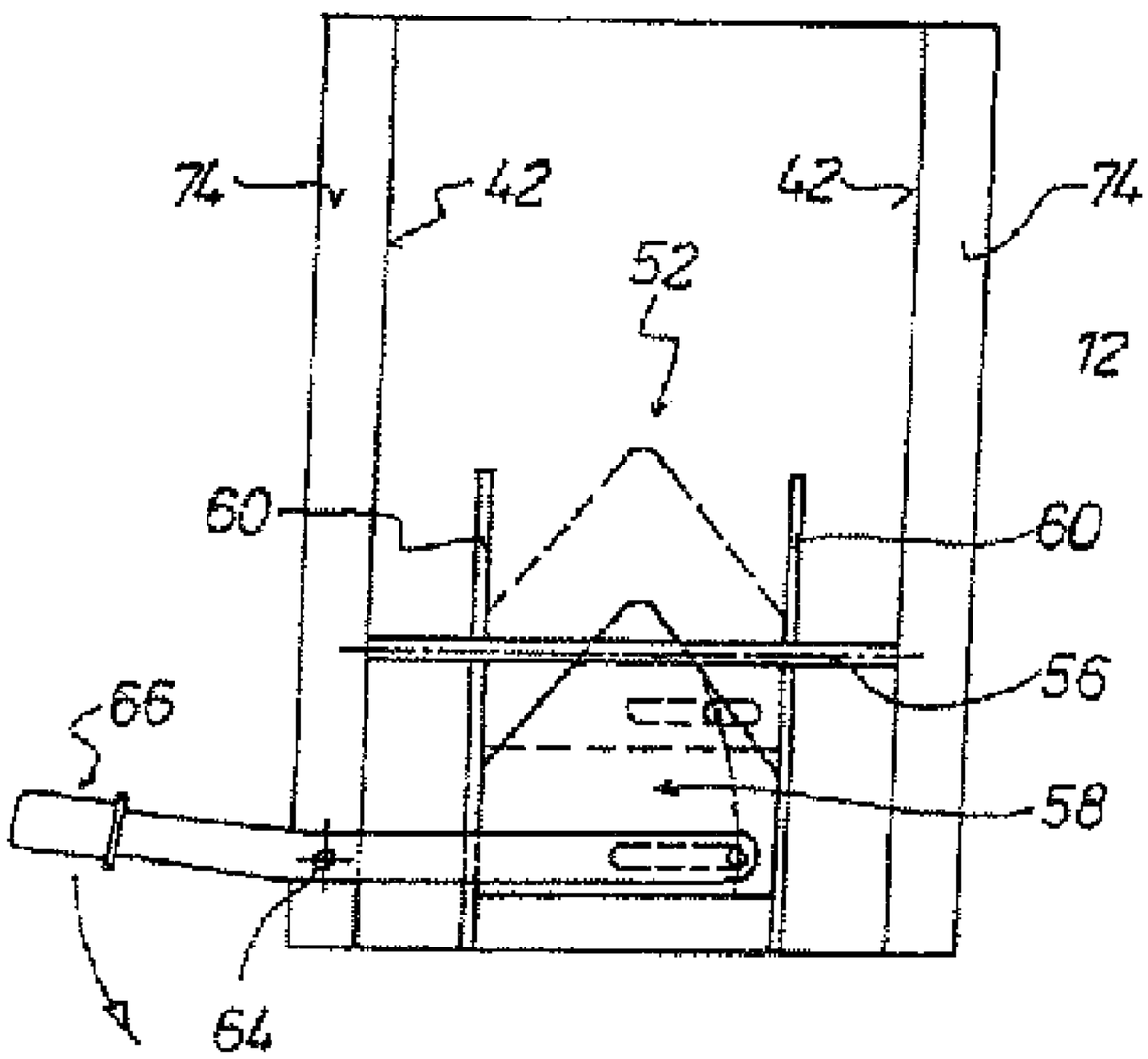
74
42
42
74
52
12
60
60
56
66
58
64

FIG. 9

SEAT HAVING A SEAT PANEL AND A BACKREST

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a national phase entry under 35U.S.C. §371 of International Application No. PCT/EP2007/010352 filed Nov. 29, 2007, published in German, which claims priority from German Application No. 10 2006 056 928.8 filed on Dec. 4, 2006, all of which are incorporated herein by reference.

The invention relates to a seat having a seat panel and a backrest, wherein the seat panel is connected to a base device by way of a first connecting device and can be adjusted with respect to the base device in height and at the same time in inclination and in the seat longitudinal direction, and wherein the backrest is connected to the seat panel by means of a second connecting device and can be simultaneously adjusted with the seat panel in inclination and in height.

The object on which the invention is based is to provide a seat such as this that combines a structurally simple design with optimum seating comfort.

This object is achieved according to the invention in the case of a seat of the aforementioned type in that the first connecting device comprises, laterally opposite one another, a pair of front and a pair of rear connecting levers, wherein the front connecting levers are longer than the rear connecting levers, in that the rear connecting levers are each designed with an angled extension so as to form toggle levers, and in that the second connecting device comprises, laterally opposite one another, a pair of rod elements which are mounted in a pivotable and linearly movable manner on the seat panel by way of their front end and which are connected in a pivotable manner to the angled extension of the rear connecting levers.

The two front connecting levers situated laterally opposite one another and the two rear connecting levers situated laterally opposite one another effectively form a parallelogram linkage between the base device and the seat panel, with the dimensioning of the front and the rear connecting levers ensuring that, during a pivoting movement of the connecting levers, the seat panel is adjusted, with respect to the base device, and as seen in the seat longitudinal direction, from an at lease approximately horizontal position into a forward and upward position and with its rear part into a downward position. At the same time, the backrest is adjusted into a forward position by way of its lower part and into a rearward position by way of its shoulder portion. This results in good seating comfort while at the same time preventing the so-called "shirt-pullout effect".

In the seat according to the invention, the seat panel may be designed with slots, and a guide element which is guided in the associated slot may be provided at the front end of the respective rod element. It is possible in this way for the front ends of the two rod elements situated laterally opposite one another to be mounted on the seat panel in a pivotable and linearly movable manner.

In another possibility, guide sleeves which are designed with a blind hole and into which the front end of the respective rod element extends in a linearly movable manner are provided in a pivotable manner on the seat panel. These guide sleeves are designed, for example, as sliding shoes.

In yet another possibility of providing the front end of the rod elements with the ability to move in a pivotable and at the same time linear manner with respect to the seat panel, guide members through which the front end of the rod elements extends in a linearly movable manner are provided in a pivotable manner on the seat panel. These pivotable guide members may be designed as trunnions, balls or the like with a through hole for the associated rod element.

It has proven to be expedient in the seat according to the invention if the two front connecting levers are each designed with an angled extension at their end portion assigned to the seat panel, with the two extensions being connected to one another by means of a connecting rod. This connecting rod is advantageously provided for a weight-adjustment device. This weight-adjustment device may comprise an elastically compliant wedge element which can be adjusted with respect to the connecting rod. In another possibility, the weight-adjustment device comprises a dimensionally stable wedge element, which is fastened to the connecting rod, and a body made of an elastically compliant material which can be adjusted with respect to the Wedge element.

It has proven to be expedient in the seat according to the invention if the seat panel has a trough-like design with two longitudinal side walls and longitudinal edges projecting laterally away therefrom on the upper side in opposite directions from one another. This results in a desired degree of dimensional stability, with it being possible at the same time for the aforementioned weight-adjustment device to be accommodated without problem.

In one design of the last-mentioned type, the longitudinal edges or the longitudinal side walls may be designed with cutouts for the connecting rod which connects the front connecting levers.

According to the invention, the base device may be provided on a chair column element. This column element may be adjustable in its length in order to achieve a height-adjustable chair. This chair is expediently an office chair.

The chair column element may comprise a damping device. This damping device is, for example, a gas spring as used in office chairs.

Further features, details and advantages will become apparent from the description which follows of exemplary embodiments of the seat according to the invention which are represented in the drawing, in which:

FIG. **1** shows a first design of the seat in an upright position,

FIG. **2** shows the seat according to FIG. **1** in a rearwardly inclined position,

FIG. **3** shows a second embodiment of the seat in an upright seat position,

FIG. **4** shows the seat according to FIG. **3** in a rearwardly inclined position,

FIG. **5** shows a third embodiment of the seat in an upright position similar to FIGS. **1** and **3**,

FIG. **6** shows the seat according to FIG. **5** in a rearwardly inclined position,

FIG. **7** shows an embodiment of a seat which is similar to the seat according to FIGS. **1** and **2** and which is designed with a weight-adjustment device, in an upright position,

FIG. **8** shows the seat according to FIG. **7** in a weight-loaded, rearwardly inclined position,

FIG. **9** shows a schematic representation of an embodiment of the weight-adjustment device of the seat according to FIGS. **7** and **8**, and

FIG. **10** shows a schematic representation of another embodiment of the weight-adjustment device of the seat according to FIGS. **7** and **8**.

FIGS. **1** and **2** show a first embodiment of the seat **10** in a side view. The seat **10** comprises a seat panel **12** and a backrest **14**. The seat panel **12** is connected to a base device **16** of the seat **10** by means of a first connecting device **18**. The backrest **14** is connected to the seat panel **12** by means of a second connecting device **20**.

The first connecting device **18** comprises a pair of front connecting levers **22** situated opposite one another on the side of the seat panel **12** and a pair of rear connecting levers **24** situated opposite one another on the side of the seat panel **12**. The front connecting levers **22** are pivotally connected to the base device **16** by means of pivots **26** and to the seat panel **12** by means of pivots **28**. The rear connecting levers **24** are pivotally connected to the base device **15** by means of pivots **30** and to the seat panel **12** by means of pivots **32**.

The front connecting levers **22** are longer between the pivots **26** and **28** than the rear connecting levers **24** between the pivots **30** and **32**.

The rear connecting levers **24** are each designed with an angled extension **34** so as to form toggle levers, with the pivot **32** being provided in the knee region of the respective rear connecting lever **24**.

The second connecting device **20**, which is intended for connecting the backrest **14** to the seat panel **12**, comprises two rod elements **36** which are situated opposite one another on the side of the seat panel **12** and which are mounted in a pivotable manner and with a limited degree of linear mobility on the seat panel **12** by way of their front end **38**. The rod elements **36** are additionally connected in a pivotable manner to the angled extension **34** of the rear connecting levers **24**. For this purpose, the respective rod element **36** is connected to the associated angled extension **34** by means of a pivot **40**.

In the exemplary embodiment of the seat **10** represented in FIGS. **1** and **2**, the seat panel **12**, which has a trough-like design with two longitudinal side walls **42**, is designed to have slots **44** at the longitudinal side walls **42**. Provided at the front end **38** of the respective rod element **35** is a guide element **46** which extends into the associated slot **44** and is guided therein without play.

FIGS. **3** and **4**, in which identical details are designated with the same reference numbers as in FIGS. **1** and **2**, represent a second embodiment of the seat **10** in the upright position and in a rearward obliquely inclined position. In this design, guide sleeves **48**, which are designed as sliding shoes, are provided on the seat panel **12**, which sleeves project away from the longitudinal side walls **42** of the seat panel **12** in an axially aligned pivotable manner and into which sleeves the front ends **38** of the rod elements **36** of the second connecting device **20** for the backrest **14** extend in a linearly movable manner.

FIGS. **5** and **6** illustrate a third design of the seat **10** in an upright and in a rearward obliquely inclined position, with identical details being designated with the same reference numbers as in FIGS. **1** to **4**. The design according to FIGS. **5** and **5** differs from the above-described embodiments of the seat **10** in that guide members **50** are pivotally mounted on the seat panel **12** so as to project laterally away from the longitudinal side walls **42** thereof, through which guide members the front ends **38** of the rod elements **36** of the second connecting device **20** for the backrest **14** extend in a linearly movable manner. The guide members **50** may be designed, for example, as cylinders, as halls or the like with transversely oriented through holes for the rod elements **36**.

FIGS. **7** and **8** illustrate a design of the seat **10** which is similar to the embodiment represented in FIGS. **1** and **2**, wherein the seat **10** is designed with a weight-adjustment device **52**. A corresponding design of the weight-adjustment device is schematically illustrated in FIG. **10**, which is a view in the direction of sight of the arrow X in FIG. **7**. In this design of the seat **10**, the front connecting levers **22** are each designed with an angled extension **54** so as to form toggle levers, with the respective pivot **28** being provided in the knee region of the corresponding toggle lever. The two angled extensions **54** are connected to one another by means of a connecting rod **56** which forms a component of the weight-adjustment device **52**.

FIG. **9** schematically illustrates a design of the weight-adjustment device **52** which comprises an elastically compliant wedge element **58** which interacts with the connecting rod **56**. The wedge element **58** is guided in a linearly movable manner along two guide elements **60**. The guide elements **60** project upwardly from the bottom **62** of the trough-like seat panel **12**.

An adjustment handle **55** which can be pivoted about a pivot **64** is connected to the wedge element **58** in order to bring the wedge element **58** more or less into operative connection with the connecting rod **56** along the guide elements **60**.

Thin dashed lines depict the wedge element **58** in an end position in which the compressibility of the wedge element **58** is comparatively small so as to achieve a corresponding seat hardness.

y contrast with FIG. **9**, FIG. **10** illustrates a design of the weight-adjustment device **52** which comprises a dimensionally stable wedge element **58**, which is fattened to the connecting rod **56**, and a cuboidal body **70** made of elastically compliant material which is guided in a linearly movable manner along guide elements **72** which project upwardly from the bottom **62** of the trough-like seat panel **12**. To adjust the elastic body **70** along the guide elements **72**, use is made of an adjustment handle **66** which can be pivoted about a pivot **64**. The pivot **64** is provided on one of the two lateral longitudinal edges **74** which face in opposite directions from one another. The longitudinal edges **74** project away from the longitudinal side walls of the trough-like seat panel **12** in one niece therewith.

Referring to FIG. **1**, the base device **16** may be provided on a chair column element **100**. The column element **100** may be adjustable in its length in order to achieve a height-adjustable chair. This chair is expediently an office chair. The chair column element **100** may comprise a damping device which is, for example, a gas spring as used in office chairs.

Identical details are respectively designated by the same reference numbers in FIGS. **1** to **10**, which means that there is no need to give a detailed description of all the details in each case in conjunction with the figures.

The invention claimed is:

1. A seat having a seat panel and a backrest, wherein the seat panel is connected to a base device by means of a first connecting device and can be adjusted with respect to the base device in height and at the same time in inclination and in a seat longitudinal direction, and wherein the backrest is connected to the seat panel by means of a second connecting device and can be simultaneously adjusted with the seat panel in inclination and in height, characterized in that the first connecting device comprises, laterally opposite one another, a pair of front connecting levers and a pair of rear connecting levers, wherein the front connecting levers are longer than the rear connecting levers and wherein each of the front connecting levers and the rear connecting levers is articulated with one end thereof at the base device and another end thereof at the seat panel, in that the rear connecting levers each comprises an elongated main portion and an angled extension so forming a toggle lever, the angled extension extending in a direction facing away from the backrest from the elongate main portion, and in that the second connecting device comprises, laterally opposite one another, a pair of rod elements which are mounted in a pivotable and linearly movable man-

ner on the seat panel by way of their front ends and which are connected in a pivotable manner to the angled extension of the rear connecting levers.

2. The seat as claimed in claim **1**, characterized in that the seat panel is designed with associated slots, and in that a guide element which is guided in the associated slots is provided at the front end of the respective rod element.

3. The seat as claimed in claim **1**, characterized in that guide sleeves into which the front end of the respective rod element (extends in a linearly movable manner are provided in a pivotable manner on the seat panel.

4. The seat as claimed in claim **1**, characterized in that guide members through which the front end of the rod elements extends in a linearly movable manner are provided in a pivotable manner on the seat panel.

5. The seat as claimed in claim **1**, characterized in that the front connecting levers are each designed with an angled extension, said extensions being connected to one another by means of a connecting rod which is provided for a weight-adjustment device.

6. The seat as claimed in claim **5**, characterized in that the weight-adjustment device comprises an elastically compliant wedge element which can be adjusted with respect to the connecting rod.

7. The seat as claimed in claim **5**, characterized in that the weight-adjustment device comprises a dimensionally stable wedge element, which is fastened to the connecting rod, and a body made of an elastically compliant material which can be adjusted with respect to the wedge element.

8. The seat as claimed in claim **1**, characterized in that the seat panel has a trough-like design with two longitudinal side walls and longitudinal edges projecting laterally away therefrom on the upper side in opposite directions from one another.

9. The seat as claimed in claim **8**, characterized in that the longitudinal side walls are designed with cutouts for receiving ends of a guide element.

10. The seat as claimed in claim **1**, characterized in that the base device is configured for mounting on a chair column element.

11. The seat as claimed in claim **10**, characterized in that the chair column element can be adjusted in its length.

12. The seat as claimed in claim **10**, characterized in that the chair column element comprises a damping device.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 8,215,710 B2
APPLICATION NO. : 12/517401
DATED : July 10, 2012
INVENTOR(S) : Christian Erker

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Specification

Column 2, line 16, “Wedge” should read -- wedge --.
Column 4, line 21, “y contrast” should read -- By contrast --.
Column 4, line 34, “niece” should read -- piece --.

Signed and Sealed this
Tenth Day of February, 2015

Michelle K. Lee

Michelle K. Lee
Deputy Director of the United States Patent and Trademark Office